



FEBRUARY 1987

COLORADO SPRINGS,
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PIKES PEAK RADIO AMATEUR ASSOCIATION, INC.

P.O. Box 16521

Colorado Springs, CO 80935

FIRST CLASS MAIL



Ø BEAT



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The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at Giuseppe's Depot Restaurant at 10 S. Sierra Madre at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Phil Somers VE1ARC, 1075 Allegheny Dr. Colorado Springs, CO 80919 590-7136

FROM YOUR SECRETARY

I want to thank all those who help in the Pikes Peak Radio Amateur Association. We do need some information from all of you on what you want out of your club. The Board is only to carry out your desires. We need some volunteers for the vacant chairmanships. If you have any suggestions, bring it to your President, or to one of the Board members. The aim of the Board is to make your club your club.

I will try to give a rundown on myself. I was born in a small town called Edgewater, Florida in 1923. I moved to New Smyrna Beach, Florida at a young age and attended school there. I joined the Navy in January 1941 and served as an aviation mechanic in several squadrons and on several ships. I retired in 1961. I married the former Francis Zengerle in 1943 and have one son and one daughter and four grandchildren. I went to work for the Civil Service in 1962 at the Overhaul and Repair Department at NAS North Island, San Diego, CA. I retired from there in 1980. We moved to Colorado Springs in December 1980.

I became a ham in 1979. My interest is VHF and UHF. I like to go out on local Colorado, Kansas, and Nebraska grid Dx-expeditions. I like to take part in Field Day operations and public service work. I love to go to hamfests and really enjoy the big one in Dayton. I am also on packet. Packet is a frustrating experience in the Pikes Peak region with all the multistep.

Will be looking forward to seeing you all at the next club meeting or the Saturday morning breakfasts, 73.

Al Vrooman, NØCMW, Secretary



Al, NØCMW operates a large number of VHF and UHF rigs, as well as several computers in his well-equipped shack.

FEBRUARY MEETING

The next regularly scheduled meeting of the Pikes Peak Radio Amateur Association will be held on Wednesday, February 11 at 7:30 PM at Giuseppe's Depot at #10 S. Sierra Bt. The program will feature Marshall Quist, AGØX, Director of the ARRL Rocky Mountain Division.

"VIEW FROM THE PEAK"

by George Hinds, NSCIX

WE GO CROSS-COUNTRY — AGAIN!

With family in Iowa and Michigan, and friends we had to visit in Ohio and North Carolina, our holiday season vacation (vacation from retirement?) was the reason for a motor trip to those states and many places in between. Just under 6000 miles, beginning to end.

With four radios in the car, away we went, looking somewhat like a greyish porcupine ambling along. We heard some trucker comments on channel 19: "Watch for that grey Chevy - he's got several antennas; may be a 'Smokey' in a plain wrapper."

Well, after 5600 miles of mobiling, here are some notes and observations for entertainment and enlightenment...

PACKET CONTINUES TO BOOM EVERYWHERE

From the Carolinas westward, with 145.01 set in scan mode on the rig, not many counties were traversed without the familiar racket of packet sounding off. I learned that 145.01 is getting so busy in many areas that additional frequencies are a must. For example, Tennessee is one place where 145.01 in some locales is jammed with traffic at times. Statewide packet coordinating groups are needed to alleviate jams such as this. Some think packet has grown too fast - nevermind, it is there to be reckoned with and it will only grow more, so planning and cooperation are essential.

PUBLIC SERVICE HAS ITS HAZARDS!

Most of us gain a sense of personal satisfaction in being a part of amateur radio public service projects. Seldom do we pause to consider risks we may encounter. I figure common sense will keep me safe. But will it?

While driving toward Washington, DC I learned of an accident that almost cost an amateur his sight in the left eye; it happened during a public service event in

Charleston, W.Va. K8SOR was with a group during a fireworks show for the city on a river barge. The largest fireworks blast of the evening was a 16" mortar; it exploded when only a few feet out of the tube!

A golf-ball size chunk of phosphorus struck K8SOR just below the left eye; he was 65' from the explosion site. As a result, he was in surgery for several hours. I understand he is recovering. As the fireworks were city-sponsored, there was insurance. Very, very fortunate.

To those of us who were in on the "Big Blast" when Lake Erie ARA served the City of Lakewood (OH) on the 4th a few years ago, the story has a familiar ring. Luckily, none of us were injured, but when all the fireworks on hand for the evening show exploded in one blast, some were looking for foxholes - right? A public service event not soon to be forgotten! But we went right back again the next year, and the year after; one of the reasons we amateurs are allocated spectrum is the expectation that we are there for public service.

DO THEY EVER LEARN?

Riding along, listening to one conversation after another on mostly two meters, it's evident that we have some slow-learners or non-readers in hamdom. In November 1976 the FCC changed the ID regulation: "mobile" or "portable" signing was eliminated. Well, some folks still haven't got the message.

Another ID rule change about 1981 brought forth the following regulation: "Each amateur radio station shall give its call sign at the end of each communication, and every ten minutes or less during a communication." No need to give the callsign of other stations, only your call. Listen around - rather odd that in 5 years many hams still haven't learned.

LINKING REPEATERS IS GOOD FOR TRAVELERS

I found a couple of instances on this most recent journey where, without the repeater I called in on being linked to another, I would not have gotten a response to my call. Granted, it wasn't an

emergency - just looking for a chat - but had it been, my chance of getting a response could have been little or nil, as my response came from the other system in the link.

Two meter FM is a way for traveling amateurs to get highway assistance, to learn of what to do and see, to help keep themselves awake and alert on long drives and to make new friends. Wider coverage can provide more chance of response, so linking of adjoining repeaters is usually just good sense.

With so many repeaters now so little monitored and seldom busy, why not go for more linking? Especially during times when few users, or listeners, are around?

If you're traveling with a co-pilot aboard, he or she can probably write down callsigns, times and dates, or whatever other notes about those whom you contacted that you might want for reference, or for a QSL exchange. A handy aide that I carry is a micro tape recorder: it takes down all the above with no effort on my part other than to click it on and off.

TIRED OF "MAGNET" MOUNTS ON AND OFF?

Hesitate to advertise the fact that a rig is in your car because of possible theft? Disgusted with crimped cables in car doors? If so, why not consider using a "disguise" antenna as is often used by police and government agencies?

Antenna Specialists is widely known among such users and service shops for its line of disguise antennas; you'll find them available for VHF-UHF (except 220 MHz but that can be easily remedied by the user) and they offer models that look like factory installed AM-FM antennas for most cars. An added advantage: they have couplers available that allow use of their antenna with your car radio and your transceiver.

For more details, write and ask for their amateur catalog to: Antenna Specialists, 12435 Euclid Avenue, Cleveland OH 44106.

REMEMBER: MORE STATES USING 20 KHZ BAND PLAN ON TWO METERS NOW -

Traveling through both Michigan and Alabama one needs to remember that the 20 KHz band plan is now being implemented. I had forgotten that and wondered why some of my favorite repeaters weren't on the air. Well, they were on the air but on a different frequency pair than shown in the ARRL Repeater Directory.

While there is some dispute now in Alabama as to the change, I didn't hear any dispute when I questioned some folks in Michigan on various repeaters; some that had already changed, others that had yet to change or weren't required to - they are switching fast in spite of the protests from neighboring states and Ontario. This action is like that taken previously by several states and two Canadian provinces: Oregon, Montana, Washington, Utah, Idaho, British Columbia and a section of Alberta.

Such a change is being made to do away with the vexing adjacent channel interference problems often resulting from the 15 KHz spacing more commonly in use elsewhere.

FLYING GRAVEL CAN RUIN ONE'S DISPOSITION

Cracked and pitted windshields from flying gravel and sand are a Colorado hazard that most of us suffer from on an average of about once a year (based on my experience to date - I've been here two years and replaced two windshields). The guys at the local glass shop know me by sight. It's no wonder the local Yellow Pages are full of auto windshield repair and replacement shops. This trip resulted in some more windshield chips, and losing a headlight from a passing truck throwing gravel in western Tennessee.

Kinda makes you wonder - with all the nifty gadgets they think of to put into cars today - turbos, "space ship" instrument panels, and a host of other neat things, how about a chip- and crack proof windshield? That's all for now; see you next time.

73, George N8CIX

VHF & ABOVE NEWS by NK0P

CC CONTEST! TNA to all who helped the club in the January VHF Sweepstakes. The local activitie was up from last year but the DX was pretty dismal. Hope everyone had a gud time. The next VHF contest is in June, watch Zero Beat for details.

There are many organizations and news letters available to the VHF enthusiasts. The oldest is SMIRK (Six Meter International Radio Klub). Dues are \$3 year and include a newsletter several times a year. Send inquiries to: 7158 Stone Fence Dr., San Antonio, Tx. 78227.

For 2Meters there is SWOT (Sidewinders on Two) info from: Howard Hallman, WD5DJT, 3230 Springfield, Lancaster, Tx. 75134.

The North Texas Microwave Society has a new newsletter and have set many new record QSO's. Info: Kent Britain, WA5VJB, 1626 Vineyard, Grand Prairie, Tx. 75052.

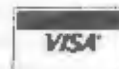
Another gud source of current info is VHF/UHF and ABOVE the have aprox. six bulletins per year. Info to: PO BOX 270 W. Terre Haute, IN 47885.

Locally the Front Range Microwave Group had another meeting at the KOSI studio in Denver. For info contact KOKE Keith Erickson.

Need more soup on 144MHZ? CCI Electronics has introduced an all mode linear amp for 144-148 MHZ. With 25 watts of drive you can get about 600 watts out. The amp uses the new Eimac 3CX800A7 triode and will set you back about 1KD (kilo-dollar)

The VHF Shop is officially gone out of business. However most of the products can be ordered through Transverters Unlimited. Info: Hans Peters VE3CRU PO Box 6286, Station A, Toronto 1P3M5M, Canada. Also Q Products carries high power 8877 Amp kits and associated parts. Info: Gene Shea KB7Q 417 Staudahel Street, Bozeman, MT 59715 (406) 587-9150

Need odd stainless steel antenna hardware? Send to J. Schmidt & Son 1908 Sunnyside Pike, Harleysville, PA. 19438 for a catalog. If you are having any RFI trouble on 2meters or 6meters I have a few 60db notch filters. These work very well if the trouble is only one frequency. Well thats it for this month. 73's and CU on the bands. Ron NK0P



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FREE MEMBERSHIP FOR NOVICES !!!!!!!

Any novice anywhere in the Pikes Peak region licensed after 1 Jan 87 can get free membership in the Pikes Peak Radio Amateur Association for one year. See the treasurer, Bud, N0DDF for details.

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Drake 2B Rx, mint condition \$125

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Kenwood TH-21AT w/2 batteries; DC-21 converter w/cigarette lighter plug cord case; MN ext. belt battery pack; BNC ant. adaptor. Exc. condition \$150

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NEC LQ-15 Daisy Wheel Printer, like new w/2 print wheels \$250

Contact George Hinds, N8CIX
Woodland Park 303-687-2610



My ham shack is slowly being invaded by that "creeping grey menace" which is increasingly occupying the world of ham radio - the computer. It hasn't reached the point envisioned by so many authors, i.e. my computer alone in the shack ceaselessly working other computer-run stations, though I think it's apparent to all of us humans that it could happen. Certainly, the memory and power of the common home computer are sufficient to operate the rig.

There is one area of ham radio in which the computer is almost a necessity, and yet the home computer has neither the speed nor memory to do a really good job. That, of course, is the field of antenna design. A brief look at the problems of antenna design and the kind of software it involves will reveal why.

Antenna design involves two fundamental processes - analysis and synthesis. Analysis is a pretty hard task. It is the process of determining the performance of a given antenna. For example, if an antenna is described as such-and-such a current here and another current there, it is a problem of analysis to calculate the pattern of the antenna, or its impedance, or efficiency. Unfortunately, the real world is seldom so kind. Antennas are usually specified as "a wire here and a wire there," so that the analyst must first find the currents, and then the pattern, etc. Think about it - given a configuration of wires and a point to feed it, how would you go about finding the currents (amplitude and phase are both important) all over the antenna? Except for a few simple cases, people can't solve these with pencil and paper.

Computer programs have been developed over the years to solve real antenna problems. They were developed for large computers, though we now have several good ones for microcomputers. A good example of an antenna analysis code for personal computers is MININEC, which is now in version 3. It will analyze antennas composed of a modest number of wires in a reasonable time. It

determines the currents, patterns, impedances and efficiencies by the "method of moments."

The latest version runs on an IBM PC, and takes up 45K for the code alone, and up to 64K for data. A typical 3 element yagi could take up to 4 hours per frequency to analyze. A really complicated antenna, say a 1H6DX, could take days per frequency - if the data could fit in the computer!

Another antenna program for the home computer is of the first kind of analysis mentioned. ANNIE determines the patterns of antennas over ground (real ground, not just "perfect ground" which exists only in the minds of antenna engineers). It also does array calculations. If you want to gang 16 yagis together and give moonbounce a try, ANNIE would help you do it right. However, it does not start with the problem of finding the currents in all the pieces of all the antennas. It assumes the currents (patterns, actually, which are found from the currents) of each basic kind of antenna it considers. In general, this gives good results providing the antennas are not too close to each other or ground.

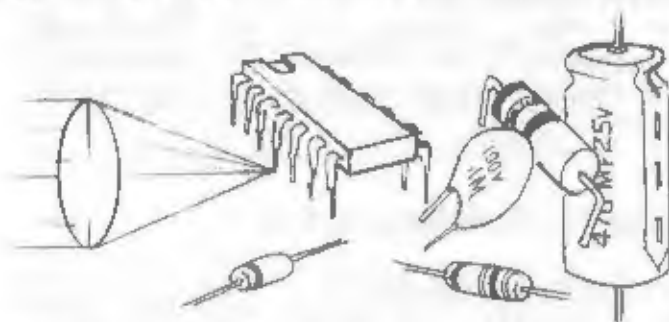
The problem of synthesis is really hard! Yet it is the one most of us would like to be able to solve. It is the determination of the structure which will yield a desired pattern, impedance, or other property. It's like asking, "What kind of antenna will give me a signal 40dB over in Rio, 20dB over in Portland, and null out that noisy power line just to the east?" I am not aware of more than a few programs which attempt to solve such problems. Those few run only on main-frame computers, and do a rather poor job. They produce results which only approximate the desired parameters, and frequently require structures which cannot be built! I know of no true synthesis codes for home computers.

At least for now, they can't build computers fast enough, big enough and cheap enough (for me) to do state of the art antenna design at home. But they're getting closer all the time. Until then, the traditional ham cut-and-try approach will turn up new, good designs

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as it has in the past. The intuition of an experimenter with lots of experience won't be replaced by the computer. In the next few years, though, it may get another powerful tool to help it along.

Bits from the BBS

by Bdale Garbee, N3EUA
sysop of The HIP Shack,
303/593-0766, 300-2400 baud

Howdy! This is the first of a series of columns talking about what's happening in telephone BBS land. For those of you who don't know, I have been running a Bulletin Board System, or BBS, for several years. When I moved to Colorado Springs from the East Coast in June of last year, I moved the BBS with me. It is called "The HIP Shack" and is devoted almost entirely to ham radio and SWL. Of particular note is the fact that the HIP Shack is now the central distribution point for the TCP/IP software for packet authored by Phil Karn KA9Q, Mike Chepponis K3MC, and myself.

Elsewhere in this issue is a tutorial on use of the BBS for beginners. If you haven't used BBS's before, you should read that before you finish this column.

So what is this column going to include?

First and most important: answers to questions that users commonly ask. I'll also include bulletins about changes in the system's overall configuration and/or operation, and about new software or discussion areas that show up on the board.

The biggest news this month is the changeover from Fido(tm) BBS software to the new Opus software. From the user's view, very little is different. For the sysop however, a lot has been added to make the job of maintaining the system easier. One neat feature is that now, when you look at the files in a given file area, any new files will be marked with an asterick (flashing bright asterick in ANSI mode). This should make it easier for everyone to see what files have been updated.

In the files area, from Jeff WA7MBL comes YAPP 2.0, a terminal program for packet operators using the IBM PC or compatibles, along with the latest v3.12 release of the WA7MBL packet BBS software. A new release (vB70119.0) of the KA9Q TCP/IP software for packet is now online for download. And for the graphics fanatics in the audience, a demo of NAPLPS capabilities is now in the graphics files area... it will run on any PC or compatible with a standard CBA card or equivalent.

I'll finish up for this month by inviting everyone to log in to the BBS if you haven't already. If anyone has any questions they would like to have answered in future columns, let me know. Finally, everyone who has neat public-domain or shareware software or files that pertain to ham radio, swl, or anything close... PLEASE UPLOAD IT!

A BBS Tutorial

by Bdale Garbee, N3EUA

Elsewhere in this issue is the first installment of a column on happenings in the world of telephone BBS's. This article is an attempt to take some of the mystery out of this "mode" for those of you who aren't familiar with the concept.

So what exactly is a BBS? Packet operators will think of it as a packet BBS that you access using a modem and telephone line. BBS's contain "message areas" where users can enter and read messages to other users. There are also

"files areas" where various programs, documents, and other random computer files are stored for download by users.

The HIP Shack, for example, has several message areas, handling local traffic, network mail (more on that in a later column), and special discussion areas for SWL, ham radio, packet, and NAPLPS (a graphics standard). The files areas include a general program area with code practice programs, WA7MBL's YAPP and PBB6 packages for packet, and other similar stuff. There are also separate areas for NAPLPS graphics programs and frames, the KA9Q TCP/IP software for packet, and an area maintained by Dlx KCORL containing packet maps from all over.

So what do you need to use the BBS? You'll need a terminal or computer equipped with communications software, a modem capable of either 300, 1200, or 2400 baud operation, and whatever cables are required to connect the terminal/computer to the modem, and the modem to a phone line.

Once you're all hooked up, dial the phone number given above. As soon as your modem connects with the modem on the BBS, a banner will be printed telling you to hang on while the BBS is loaded. This is because a separate program runs most of the day to watch for network mail. When it realizes you are a human caller, it loads and runs Opus, the bulletin board software.

As a new user, you will be asked to pick a password, and to enter at least your voice phone number, city, and state. There will soon be a more comprehensive questionnaire for new users. You will also be asked if your terminal or communications program supports ANSI escape sequences. For the most part, this is only yes for people using IBM PC's or clones with the ANSI.SYS driver loaded. Everyone else should answer no.

As soon as you've answered the questions, you're in! From the main menu, there are three major things you can do. First is the C)hange option, which will allow you to alter your terminal parameters, change your password, etc. Second is the M)essage Areas command, which will put you into the part of the system where you can read and enter messages. Third is the F)iles area where all the good programs are stored.

MINUTES OF JANUARY GENERAL MEETING submitted by Al NØCMW, secretary

The general meeting of the Pikes Peak Radio Amateur Association was held at Giuseppe's Old Depot Restaurant, Wednesday evening 14 January 1987. The meeting was called to order by the president Don KEØBJ at 19:30. Don asked all the members and guests to introduce themselves, and to mention their plans for 1987. There were 55 total in attendance. The minutes of the last meeting were approved as printed in Ø-Beat.

Committee Reports

Treasurer - Bud NØDDF: Previous balance of \$1839.04, income of \$570.80 with expenses of \$1049.78, leaving a balance of \$1360.06.

Interference - Ron NKØP: No complaints. Now have an RFI trouble shooting kit.

SwapFest - Ron NKØP: 16 May 1987 at Rustic Hills Mall. Had meeting on Jan 11 with Mall manager and signed contract. Grand prize: ICOM HF transceiver.

Pikes Peak Hill Climb - Malcolm - KE9B: Hill climb will be 11 July 1987. Ready for volunteers.

Education - Don NL7CD: Al NØCMW reported that the Tech/General upgrade will be given at the civil defense building beneath the police station beginning on 28 Jan 87.

Publicity - Ron NKØP: Would like to give up the publicity job.

Colorado Council of Amateur Radio Clubs (CCARC) - Bud NØDDF: Next meeting in Denver on Feb 21.

Deaf and Blind School - Jim WA9ABB: Ron NKØP reported that the school needs volunteers to build a voice synthesizer box.

Ø-Beat - Phil VE1ARC: Thanks to the regular contributors. However, would really like to get articles from the other club members. How about a new column?

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ARES - Jim WA5SKK: Has application forms for joining ARES.

Public Service - Mike KØTER: Nil.

Club Trailer - Pete NØLA: Nil.

Field Day - Tom ADØB: Nil.

VE Testing - Ron NKØP: Ron reported for Max KØOEL that the exams will be on Saturday, 14 February 1987 at the First United Methodist Church on north Nevada..

Old Business:

The donated ARRL library books were not yet on the shelves.

The Handi-Talkie at the Christmas party was won by Rick WB7THT.

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New Business:

Bud WBØTIB: A new proposal is being submitted to the county on the height limits for towers. There will be a weather spotters training class on April 5, 1987 at 1330, location to be announced later. Thirty page booklet at meeting. Reminder: maintain accurate address with FCC.

Larry KAØNL: He had gotten a radiogram for someone to be an Elmer for a prospective novice. Had a couple of volunteers. Larry is to find out just where the prospective novice lives.

Resignation: President Don KEØGJ read a letter of resignation from Vice President Don NL7CD due to pressing military commitments. The board had recommended Ron, NKØP. There being no nominations from the floor, Ron was elected by acclamation. Board had recommended Nick, KØ5N to fill Ron's board vacancy. Nick was elected by acclamation.

Smoke/Stretch Break: The President had asked the members to please refrain from smoking, so prior to the program, he called a break. The smoke-free room was very much appreciated by all the non-smokers. Thanks.

Prizes - Ron NKØP: Ron announced a special thanks to the advertisers that provided prizes, namely Centennial, Wintronics, and OEM Parts. He encouraged members to support these businesses.

Winners were:

KEØGR	Jerry	ARRL 87 Handbook
KDØGE	Herb	Xtra class manual
WØNCT	Doc	???
WØJNZ	Ralph	Centennial \$10. cert.
TBA	Shannon	ARRL Rulebook.
WA5SKK	Jim	Club hat
NØBYW	Karl	Wintronics \$10. cert.
WB7THT	Rick	Village Inn breakfast
N3EUA	Boale	Village Inn breakfast
KAØYLR	Sylvia	Bowling at Uta Lanes

Program:

January meeting is Homebrew night. The following submitted very nice projects:

Nick - KØ5N:

ST6 RTTY demodulator
12 amp, 10-15 volt power supply
8 channel 2-meter scanner

Ron - NKØP:

10 Gigahertz transceiver, 7 milliwatts,
with a 17db gain antenna

Lauren - KXØD:

Kilowatt amp on 432, with 30 watts in.
Has submitted it to QST

Ray - AAØLI

All band receiving converter to 500
MHz.

David - WBØRRU:

J-antenna for 2 meters

J-antenna for 220 Mhz

5 element collapsible 220 Mhz beam

Don - KEØBJ:

Huge CW key for QLF operations

Winners were:

1. NKØP - \$20.

2. KØSN - \$10.

3. KXØD - \$ 5.

The next meeting will be 11 Feb 1987.

MINUTES OF THE JANUARY BOARD MEETING

submitted by Al, NØCMW, Secretary

The board meeting was held on
Monday, 19 Jan 1987 at the home of
Don KEØBJ on the west side. It was a
sliding slipping drive to his QTH on our
nice icy streets. Those in attendance
were Don KEØBJ, Al NØCMW, Bud NØDDF,
Phil VE1ARC, Ron NKØP, Les KCØNC and Nick
KØSN.

It was discussed that the refrain from
smoking was felt to be quite harsh by
some so will try a policy of "please try
to limit your smoking".

The grand prize for the swapfest will
be an Icom 735 transceiver. Will make up
a two page flyer to send out to all hams
in Colorado Springs area that are not
members of our club. Will sell ads to
cover the cost. Ads to be \$25.00 for a
quarter page. A committee meeting will be
held at Jim WA9ABB house on Feb 19, 1987.

It was discussed that the past custom
of having a member only eligible to win
one prize in the monthly raffles at the
general meetings was to be abolished, and
multiple winners encouraged.

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TAB BOOKS

Trying for an employee ID will be held
in abeyance for more information.

A discussion was held on the vacancy
of an education chairman, and after a
lengthy discussion, Les KCØNC
volunteered. It was decided to lengthen
the upgrade class for techs and generals.
Will plan for it to finish up just prior
to the VE exams in May.

Jim WA9ABB will try to get us a picnic
spot at the Air Force Academy. In March
when they take requests for Aug or Sept,
he will see what he can get.

Rick WB7THT was discussed as a
possible volunteer for the chairman of
the publicity committee. Rick later
accepted.

Would like to have some volunteers to
take other vacant committee chair jobs.

Brad KDØVM will give his lightning
program for our March meeting.

Next board meeting will be at QTH of
Bud NØDDF on Monday, 16 Feb. No further
business, meeting adjourned at 21.30.

DECEMBER PRIZE WINNER OF \$50 GIFT CERTIFICATE

Scott NØGXM

NEXT DRAWING SATURDAY Jan. 31



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NEW EQUIPMENT IN STOCK

New Kenwood TS 440S \$685 w/AT installed \$1020
Kenwood TS 940S \$1735 w/auto tuner \$1890 - 1 only
Kenwood TS 430S \$699
Kenwood TS 830S \$939.
PS 430 Power Supply \$154 — PS 30 \$144.
Kenwood PS 50 power supply \$149.
Kenwood AT 250 auto antenna tuner for 430S \$275 - 1 only
Kenwood AT 130 tuner \$144 AT 130 Tuner \$199.
Icom 735 w/ free 5M6 desk mike (\$44 value) \$845.
Icom 745 \$885 Icom 751A \$1395. Free CW filter (\$108 value) with purchase of either
New Yaesu 767GX goes everywhere, does everything \$1550.
Yaesu FT 737GX \$825. FC 757AT \$265 - 2 only.
Kenwood TY4000A 2m & 440 FM rcvr. Sale \$495
Kenwood TR 3600 440 MHz HT w/free extra battery \$319
Kenwood TR 2600A new HT w/extra battery Sale \$265 clearance
New Kenwood TR 751A 2 meter all mode w/GasFet preamp \$525.
Kenwood TH31BT \$329. TH41BT \$235. TH20SAT \$228. TH21SA \$298
Kenwood TH21AT \$198. TH31AT & TH41AT \$190 each - both with free extra battery
Kenwood TM 2570A 70 watt 2 meter FM mobile \$439. Limited Quantity.
Kenwood TM 2550A 45 watt 2 meter FM mobile \$359. Limited Quantity.
Kenwood TM 2530A 25 watt 2 meter FM mobile \$325. Limited Quantity.
Kenwood 211A \$300 (1 only)
Santec 20T w/2 number memory dialer \$250
Complete line of Tokyo High Power amps, preamps & tuners at lowest prices.
Santec ST442 - New 70cm. HT - \$250
New Icom 48A 440MHz \$395.
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New Icom 28H same specs as Icom 28A w/45W \$389.
Icom 02AT \$280.
Icom 2AT HT \$238.
Icom 02AT \$328.
Icom 02AT w/BP7 5 watt battery & wall charger \$339.
Icom 4AT \$293.
Icom 04AT \$375.
Icom 27A w/TTM \$349/Icom 27H w/TTM \$379.
Icom 47A \$439.
Icom 3200A 2 meter/440 dual bander \$495.
Dahwa Motors, Switches & Rotors - In Stock - The Dahwa rotor is great!!!
Mirage Amps - Low Prices - In Stock
New KDK FM 240 mini 25W w/TTM & LCD display, encoder/decoder TO 156 MHz receive \$320.
w/o tone \$290.
Yaesu FT 209RH 5 watt FM HT \$285.
Yaesu FT 2700RH 2 m-70 cm dual bander full duplex \$479; (2 only)
Yaesu FT 727R 2/70cm HT - New CPU \$398. Limited Quantity.
Yaesu FT 23R 2 Meter HT w/TT Pad \$265.
Yaesu FT 73R 70 cm HT w/TT Pad \$278.
Ten Tec Corsair II HF rcvr. \$1149.
Ten Tec Century 22 HF CW rcvr. \$349.
Special of the Month New Ten Tec TT920 Air Band HT 108-136 MHz AM \$375.
THL (Tokyo High Power) 35V 2/25 watt FM Amp GasFet preamp \$84.
Astron PS — ALL AMPS — Low Prices — Astron PS 50 and V50 In Stock
Now a factory dealer for Mosley antennas—Special prices until
3/31—full line in stock. TA33 - \$220. CL33M \$375.
Butternut HF6V 80-10 mtr. vertical \$120. Butternut beam \$180. H12V \$115.
B&W AXS 160 shortened 160/30 mtr. dipole 95' long \$94.
B&W AXS 80 shortened 80/40/15 mtr. dipole 64' long \$94.
B&W AS 80 shortened 80/40/20 mtr. dipole 78' long \$94.
Walt test meters in stock - all power levels and frequencies
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Amp Supply LK 500 ZB w/o QSK \$1000. W/QSK \$1149.
Ameritron Amplifiers - AL 60A - 1 3-500Z - In Stock. \$695. AL84 4-6M/6 \$375.
Ameritron remote antenna switch - RCS 4 & 6V - \$120.
AEA CP1/64 MBA Text Pac \$200.
AEA PK 232 data controller Internal HF/VHF modem \$305.
AEA CP-1 Computer Interface \$178.

AEA PK64A w/HFM & long cord \$355.
AEA PK 64A w/o HFM \$255.
AEA PK 64 packet/cw/tty etc. controller \$200 — HFM \$95
AEA PK 64 system w/HFM 64 installed \$310.
Kanztronics KPC 1 Level 2 - special sale \$135 - 2 only.
Kanztronics Packet Program—Includes program for LTL
Kanztronics UTU XT/P now includes Packet for HF
Kanztronics KPC 2 Packet Controller version 2 w/HFM \$165.
Kanztronics Hamtext Hamsoft VIC 20/64 \$75.
Kanztronics KAM all mode controller—
CW/RTTY/ASCII/MOTOR or Packet \$275. (HF & VHF Packet)
MFJ wet & dry dummy loads — in stock
MFJ Tuners and Keyers — in stock
MFJ 989 roller inductor tuner \$288.
MFJ 962 1.5 KW tuner—160 to 10 meters \$219
MFJ 980 3 KW tuner \$175.
MFJ 1224 interface In stock w/free soft program Fall Sale—\$75
MFJ 1229 interface w/free soft program Fall Sale—\$149.
MFJ 1270 packet controller (TNC-2) \$120.

USED EQUIPMENT

Kenwood TR 2400 - nice \$119.
Kenwood TR 9400 70 cm. \$235.
Kenwood TS 820 w/CW filter \$435.
Kenwood TS 520 \$325 firm.
Kenwood AT 250 auto tuners \$225.
Kenwood TR 2600A \$195.
Kenwood TS430S w/A/M/FM/Mike \$350.
Kenwood TS430S w/all filters & mods. Mint. \$600.
Icom 2AT \$135
Icom 02AT \$250.
Icom 02AT w/mod \$275.
Icom 27H 45W 2mtr mobile \$295.
Azden PCS 300 2 mtr. HT—nice \$150.
Tempo 94 70 cm. HT—very nice \$150. Tempo 55 \$125.
Yaesu FT706R 70 cm HT \$185.
Yaesu 737AT auto tuner \$195.
Yaesu FT 101E \$325.
Yaesu FT 757GX - Nice \$695.
Yaesu FT 207R - Nice \$115.
Drake T4X w/M54 ps/spkr \$175.
Drake R4C rcvr. \$250.
Etec digital readout for Drake C line \$65. - all 3 pieces \$395.
Heath HR10B rcvr., HX11 CW txmtr., HG10B VFO all in nice condition.
for a novice station \$100 for set.
Kanztronics KPC1 level 2 packet \$120.
Heath SB200 Amp. New Tubes. \$295.
Tokyo High Power 160V 3/70 in 160 out amp w/preamp \$275.
Mirage B10B 2 meter FM/SSB amp - HT or 10W in/80 out \$125
AEA CP1/64 w/MBA TextPac \$100.
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